

# Agtech CENTRE Innovator

Volume 11 Issue 4 August 2011



Developments in direct seeding systems continue to evolve.

## HOW MUCH POWER DOES IT TAKE TO PULL THAT AIR DRILL?

New field trials coordinated by AgTech Centre across Alberta aim to find out

Farmers could call it boot camp for air drills. Over the past year, new air drills from the major manufacturers have been put through their paces at a number of fields across Alberta, at field tests coordinated by the Alberta Agriculture and Rural Development (ARD) AgTech Centre in Lethbridge.

While many features of the latest drills are impressive, the focus of these tests is broader than performance and, indeed, very specific – how much power, and related fuel, does it take to pull them?

That may not be the first question to jump to mind for many producers considering these drills, but it's a very important one to answer for a couple of reasons. First, power requirements and related fuel use is one of the major costs of production where farmers have opportunity to realize substantial savings through management strategies that improve efficiency. Second, knowing exactly how much energy is used by different components

of production is more necessary than ever, as farms look to understand and reduce their use of fossil fuels and related emissions of greenhouse gases.

"Most of the land in Western Canada is now seeded with these newer types of drills but there's not much information on what it takes to pull them – as a result, this has become one of the most important hidden costs in agriculture," says Lawrence Papworth, a project engineer with the AgTech Centre. "We want to fill that knowledge gap."

### Field tests across Alberta

The project is as straightforward as it is targeted, says Papworth. "The best way to know what these drills require is to actually take them in the field and use them under commercial conditions." That's what Papworth and colleagues have done, by partnering with producers across Alberta. The aim has been to use the drills and measure the power requirements in a range of different operations and types of cropping systems, to get a balanced range of data.

The project started in 2010 with evaluations in a half dozen fields and several more evaluations were completed in 2011 (more were planned both years but wet conditions led to a

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number of cancellations). Plans are to analyze the results and use the information in a new farm calculator effort. The main differences between the older and newer drills are the width of the equipment and the types of openers they use. The new drills are typically 50 to 70 ft. as opposed to 30 to 50 ft. Many of these new drills use precision openers. These openers have parallel linkage movement and use the trailing packer to control the depth. They also usually place nitrogen at a shallower depth compared to the older seeders.

The expectation is the new air drills will use more power on a straight comparison basis. However, because they can accomplish more in less time, the real "proof in the pudding" measurement will be fuel use per acres seeded or bushel of crop produced. "The jury is out on the expectations for that one," says Papworth.

### Feeds into carbon calculator effort

The testing effort is tied to an ARD project aimed at developing an "Alberta Farm Carbon Calculator." The concept behind the calculator is to provide growers with a tool they can use to identify the net greenhouse gas emissions of their operations. The ability to measure this "carbon footprint" fits a number of opportunities ranging from incentive and marketing programs to emerging carbon offset markets. It also helps farmers get a handle on how much energy they are using, which can lead toward management strategies to improve energy efficiency.

"The calculator will allow producers to enter information about the acres they are managing and the type of equipment they are using, to get an accurate, customized measurement," says Papworth. "It will have information on the energy used by the different types of equipment, which will be used in the calculation."

Part of the plans for the calculator are to potentially use it as a tool in an energy assessment program ARD has developed with Climate Change Central. The program is currently available for dairy, swine and poultry facilities. The results of the assessments give producers information on how their operation uses energy and ways to save energy. The calculator would provide a way to extend this assessment program for use in field crop operations.

### Air drill info the missing link

At the current stage of development, the calculator has a good depth of information related to most equipment used on a farm, including power requirements and fuel use. This includes data from the Nebraska Tractor Test as well as from past evaluations done on a range of farm equipment by AgTech Centre, the Prairie Agricultural Machinery Institute and the former Alberta Farm Machinery Research Centre. However one major gap is information on how much power it takes to pull the newer, wider air drills.

"Once the air drills information can be added, we will be able to use the calculator to have a fairly complete picture," says Papworth.



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To measure the power requirements, Papworth and colleagues have designed an approach using a self contained power measurement device, which is placed between the power unit and hitch of the air drill. The device consists of a load cell, data logger and battery. "The accuracy of the calculator will continue to improve, as we continue to do these tests and build the database of what it takes to pull these air drills," he says.

The format for the calculator is an Excel-based spreadsheet that works on a field basis. "A producer goes into the calculator and puts in his field information, and then starts selecting the operations they did to that field. You can pick a specific tractor and then you can pick a specific implement, and add other details about the size of field and approach you are taking."

Using this information, the calculator will determine, under ideal conditions how much fuel the producer should have used. Among other things, the farmer can compare this information with actual fuel use to see if his results are generally on track or if there may be a potential issue.

"For example, we're hoping that if there is a big gap between projected and actual fuel use, a producer would go back and look at what might have caused that," says Papworth. Maybe his tractor isn't set up properly, or maybe his tractor is too big or too small for the implement. Maybe the tires have too much pressure - things like that."

The calculator will include worksheets to determine specific estimates for variables such as how much ballast and pressure the producer should have under specific conditions.

The calculator will be initially geared toward cereal crop production, says Papworth. However, plans are to expand it into other areas such as livestock and special crops.

The first version of the calculator for producer use is expected to become available later in 2011. Partners in the calculator effort include ARD, Climate Change Central and the Agricultural Research and Extension Council of Alberta (ARECA). ♦

**AgTech Centre**  
**Alberta Agriculture and Rural Development**  
**Technology and Innovation Branch**  
**Environmental Stewardship Division**

3020 College Drive South  
Lethbridge, Alberta, Canada T1K 1L6

Phone: (403) 329-1212  
Fax: (403) 328-5562

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